Declaration under 37 CFR §1.131

I, Drew Bertagna, of Oak Park, California, hereby declare and state as follows:

1. I am the inventor of the subject matter described and claimed in patent application no. 09/516,859 entitled "PRIORITY REMAPPING FOR DATA COMMUNICATION SWITCH."

2. While employed by Xylan Corporation, currently known as Alcatel Internetworking, Inc., in Calabasas, California, I assisted in the design and development of a network switch controller embodied in an Application-Specific Integrated Circuits (ASIC) known as the Kodiak. The subject matter of the present application identified above is embodied in the Kodiak ASIC.

3. As shown by at least the following facts, the invention claimed in the present application was conceived of by me at or before September 1998 and reduced to practice at or before November 1999.

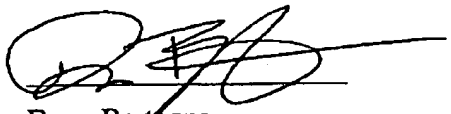
4. The general hardware requirements of the Kodiak ASIC, entitled ASIC Functional Specification: Kodiak, include the operation of the invention claimed in the application identified above. The first revision of the ASIC Functional Specification: Kodiak was completed on September 8, 1998. This document evidences the date of conception of the claimed invention. True and correct copies of pages 12-14 of the first revision of the ASIC Functional Specification: Kodiak that disclose the claimed invention are attached hereto as Exhibit A to this declaration.

5. A prototype of the Kodiak ASIC was prepared by International Business Machines (IBM) for Alcatel Internetworking, Inc. and subsequently delivered in November of

1999. The prototype of the Kodiak ASIC is evidence of a reduction to practice of the claimed invention.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 USC §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Executed this 26th day of January 2004.



Drew Bertagna

EXHIBIT A

3.2. Virtual Port Support

Kodiak supports 256 unique virtual ports locally and 8k or 32k unique virtual ports chassis-wide for X-Frame or OmniCore, respectively. Each Kodiak will have records for 256 local virtual ports in external SSRAM. For X-Frame, each Kodiak will be assigned a 5-bit value which will be the 5 msb's of the global virtual port number (vpn). When a packet is sent to the VBus, a unique 13-bit number will be inserted into the VBus header comprised of the 5-bit Kodiak number and the 8-bit local vpn. This unique value will be used at the destination Kodiak for filtering (source vpn = destination vpn) and to index into the global virtual port records in external SSRAM for performing vlan checks when the source address is unknown.

For OmniCore, each Kodiak will be assigned a 7-bit value which will be the 7 msb's of the global vpn. When a packet is sent to the VBus, a unique 15-bit number will be inserted into the VBus header comprised of the 7-bit Kodiak number and the 8-bit local vpn. This unique value will be used at the destination Kodiak for filtering (source vpn = destination vpn). No global virtual port records are required for OmniCore since the source vlan information is passed through the VBus header.

3.3. Duplicate MAC Address Support

Kodiak supports hardware processing of duplicate MAC addresses that reside in different vlan groups. There are two modes of operation for processing – one supports a Xylan CAM interface and the other supports a pseudo-CAM interface.

When Kodiak interfaces to a Xylan CAM, Kodiak performs a linear search through the CAM associated data (cad) to derive the correct CAM index. Each cad entry has a duplicate MAC link field with an associated valid bit through which the search is performed. A valid source CAM index (sci) is found when the HBus receive source virtual port number (svpn) is equivalent to the svpn stored in the sci-indexed cad. A valid destination CAM index is found when the source vlan group id for the packet is equivalent to the vlan group id stored in the dci-indexed cad.

When Kodiak interfaces to a pseudo-CAM, Kodiak will derive the correct sci in a single operation. The source MAC address and the HBus receive svpn will be provided to the pseudo-CAM which will simply return a valid match indicator and the correct sci. This mode is intended to be used in OmniCore applications. These applications do not require Kodiak to perform duplicate MAC processing on the destination MAC address. The duplicate MAC processing is performed by the Harley asic before the destination Kodiak receives the packet.

3.4. 802.1Q Support

Kodiak provides hardware-based processing for 802.1Q tagged packets. This is accomplished by (1) providing the ability to remove and insert packet tags as necessary, and (2) providing a hardware-based mapping mechanism from {physical port, packet vlan group id} pair to virtual port. The mapping is used on HBus receive and when transmitting from the flood queue.

The MAC function, which can be an internal GE MAC or an external MAC chip, provides for removing and inserting tags on a per packet basis. The receive MAC will detect tagged packets and remove the 4-byte tag. Bytes 3 and 4 of the tag value will be passed over the HBus to the packet switching engine for additional processing. The transmit MAC will receive bytes 3 and 4 of the tag value over the HBus from the packet switching engine and insert the appropriate 4-byte tag into the packet. The details of the MAC functionality and HBus protocol are described in Appendix A.

The Kodiak packet switching engine provides for two methods for mapping a {physical port, packet vlan group id} pair to a virtual port: (1) a direct map method and (2) a linear search method. The direct map method allows the mapping to be performed without implementing a search for up to 4 physical ports. The mapping tables reside in a 32k-byte section of the external SSRAM. This mode is intended to be used for GE ports and can any number of vlan groups with equal performance. The *ppn to default vpn sram* that is internal to Kodiak has a bit that indicates if the direct map method will be used for 802.1Q on a particular physical port. If this bit is set, another 2 bits in this sram entry will indicate which 1 of 4 subspaces in the external SSRAM will be used to perform the mappings on this physical port.

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The linear search method for the virtual port mapping uses an internal sram table (*802.1Q vpn sram*) to provide a link list of virtual ports that reside on a particular physical port. Each virtual port entry also has an associated vlan group id entry. After first finding the default virtual port from the *ppn to default vpn sram*, the engine walks through the virtual port links associated with a given physical port in the *802.1Q vpn sram* until an entry is found for which the packet vlan group id matches the table vlan group id. The 8-bit address for which the vlan group id match occurrs provides the virtual port number.

A tagged packet with a non-zero vlan group id value is termed a vlan-tagged packet. A packet with a null vlan group id is termed a priority-tagged packet. A priority-tagged packet is treated the same as an untagged packet except that the packet priority is valid.

Each virtual port in Kodiak has a bit to indicate that tagged and/or untagged packets must be discarded. If the discard tagged packets bit is set, all vlan-tagged and priority-tagged packets received from HBus will be discarded. If the discard untagged packets bit is set, all untagged and priority-tagged packets received from HBus will be discarded.

If the canonical indicator bit is set in the tag value that Kodiak receives from the HBus device, the packet will be passed to s/w. Also, Kodiak will have the ability to provide a tag on trnsmit with the canonical indicator bit set as desired.

PPN to Default VPN SRAM

physical port # [5:0]	direct map select	direct map table [1:0]	default virtual port # [7:0]
0			
.			
.			
63			

802.1Q VPN SRAM

virtual port # [7:0]	virtual port link valid	virtual port link [7:0]	vlan group id [11:0]
0			
.			
.			
255			

3.5. 802.1P Support

The tag in 802.1Q packets contains 3-bits of priority that can be used to allow for quality-of-service. When a tagged packet is received by the MAC device, the 2-bytes of tag that contain the priority value are passed over the HBus to the packet switching engine. The 3-bit priority value is then remapped through the *source priority remap sram* on a source virtual port basis to allow Kodiak to control the priority level that the source device actually receives. This 3-bit priority value is then passed in the VBus header to the destination Kodiak along with a source-based quality-of-service (sqos) indicator bit. The sqos indicator bit value derived from the sci-indexed cam associated data (cad) if the sci is valid or from the local virtual port records (lvpr) if the sci is invalid.

At the destination Kodiak, the 3-bit priority value and the sqos bit are stripped from the VBus header. If the sqos indicator bit is set, the priority value is used to remap the default destination queue id from cad to a new queue id using the *queue id remap sram*. This new queue id is used to queue the packet. If the sqos indicator bit is not set, the default queue id from cad is used to queue the packet. If the destination port is a tagged port, the priority value received from the VBus is passed across the HBus to the MAC device to be inserted into the transmitted packet.

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In an OmniCore system, the Harley asic will also make use of the VBus priority value and the sqos indicator bit. If the sqos indicator bit is set, Harley will signal the packet priority through the OmniCore fabric based on the priority value in the VBus header.

Kodiak extends the ability to pass source priority through the system to untagged packets as well. Each cad entry contains 3-bits of priority and an sqos indicator bit. When the sci is valid, the sci-indexed cad priority value and sqos indicator bit will be inserted into the VBus header and passed to the destination Kodiak. When the sci is invalid, the priority value and sqos indicator bit from lvpr will be used. The priority processing on the destination Kodiak will remain the same as described for the tagged case.

Source Priority Remap SRAM

source vpn [7:0]	remapped priority [2:0]							
	input priority [2:0]							
	7	6	5	4	3	2	1	0
0								
.								
255								

Queue ID Remap SRAM

cad queue id [7:0]	priority [2:0]	remapped queue id [7:0]
0	0	
.	.	
0	7	
.	.	
255	0	
.	.	
255	7	

3.6. Group Mobility Support

Kodiak supports group mobility processing for all encapsulations and protocols. When group mobility processing is enabled on a virtual port, the protocol type of each packet will be determined and used along with the HBus receive source virtual port number (svpn) and the source MAC address to find the appropriate source CAM index (sci). Any exception cases that do not yield a valid sci will be handled by s/w.

There are two modes of operation depending on if the the source-base lookups are performed by a Xylan CAM or by the pseudo-CAM. When a CAM is being used, Kodiak performs a linear search through the CAM associated data (cad) to derive the correct CAM index. Each cad entry has a duplicate MAC link field with an associated valid bit through which the search is performed. A valid sci is found when both the HBus receive svpn is equivalent to the svpn stored in the sci-indexed cad and the packet protocol type is equivalent to the protocol type stored in the sci-indexed cad.

When Kodiak interfaces to a pseudo-CAM, Kodiak will derive the correct sci in a single operation. The source MAC address, the HBus receive svpn, and the packet protocol type will be provided to the pseudo-CAM which will simply return a valid match indicator and the correct sci. This mode is intended to be used in OmniCore applications.